UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/715,170	11/17/2003	Kamal Jain	MS1-3956US	4120

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EXAMINER
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ART UNIT	PAPER NUMBER
3623	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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	Application No.	Applicant(s)
Office Action Summary	10/715,170	JAIN ET AL.
	Examiner	**Art Unit**	
	Neil R. Kardos	3623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on _30 October 2009_.
2a) ☒ This action is **FINAL**.   2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) _1-30_ is/are pending in the application.
   4a) Of the above claim(s) _30_ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) _1-29_ is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
   Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
   Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All   b) ☐ Some * c) ☐ None of:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____.
   3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
   * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
   Paper No(s)/Mail Date _10/30/2009_.
4) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____ .

DETAILED ACTION

This is a **FINAL** Office Action on the merits in response to communications filed on

October 30, 2009. Currently, claims 1-29 are pending and have been examined. Claim 30 has

been withdrawn from consideration.

Response to Amendment

Applicant has cancelled claims 31-34. The objections and rejections of these claims have

been withdrawn.

Applicant's amendments to claim 16 are sufficient to overcome the § 101 rejections set

forth in the previous office action with respect to claims 16-27.

Applicant's amendments to claims 1 and 28 are NOT sufficient to overcome the § 101

rejections set forth in the previous office action with respect to claims 1-15 and 28-29. These

rejections have been maintained below.

Claim Objections

Claims 16-27 are objected to because of the following informalities:

<u>Claim 16</u>: Claim 16 recites "causes on or more processors to perform . . . ." In this

recitation, "on" should be amended to recite "one."

<u>Claim 17-27</u>: The dependent claims are objected to for failing to remedy the deficiencies

of the claims from which they depend.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-15, 28, and 29 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claim 1: Claim 1 is directed toward a system. However, the claim does not positively recite any elements that necessarily constitute a system or apparatus, such as computer hardware. Rather, the claim could be directed to software. Software per se is not patentable under § 101; therefore, the claimed invention does not fall within a statutory class of patentable subject matter. *See* MPEP 2106.01. Furthermore, it is not clear whether the claim is directed to a system comprising computer hardware, or to a computer readable medium comprising instructions for execution. The claim recites a "system . . . comprising computer components," but the computer components are stored in a compute readable media. Hardware components necessary to constitute a system cannot be stored on a computer-readable medium. Once again, because the system could be software per se, it is not patentable under § 101. Page 6 of the originally filed specification makes clear that a "component" can be entirely software.

Furthermore, one may not patent every "substantial practical application" of an abstract idea. *See Gottschalk v. Benson*, 409 U.S. 63, 71-72 (1972). Here, the claimed invention is an abstract idea (approximating a solution to a linear program). Because the claimed invention could be used to approximate solutions to linear programs in any field, rather than being limited to a particular field, the claim covers every substantial practical application of the algorithm. Applicant should amend the claims so as not to cover every substantial practical application of

the algorithm. Although the preamble of the claim recites "to analyze network data routes for

data dissemination," a preamble is generally not accorded any patentable weight where it merely

recites the purpose of a process or the intended use of a structure and where the body of the

claim does not depend on the preamble for completeness but, instead, the process steps or

structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15

(CCPA 1976); *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

Furthermore, a preamble generally is not limiting when the claim body describes a structurally

complete invention such that deletion of the preamble phrase does not affect the structure or

steps of the claimed invention. See MPEP 2111.02. Here, the claim body is capable of standing

alone and does not require the intended use recited in the preamble for completeness.

Claim 28: Claim 28 is substantially similar to claim 1 and is rejected under similar

rationale. Specifically, the "means for" could refer to the "components" defined on page 6 of the

specification. Such components could be entirely software.

Claims 2-15 and 29: The dependent claims are rejected for failing to remedy the

deficiencies of the claims from which they depend.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-15, 28, and 29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1: Claim 1 recites "a user input" as a "computer component" that is stored on a compute readable medium. It is not clear how a user input is a computer component. The claim should be amended to recite "a component that receives a user input."

Claim 28: Claim 28 recites "means for" performing various operations, such means being stored in a computer readable medium. Page 6 of the originally filed specification makes clear that the "means for" could be entirely hardware. Hardware cannot be stored on a computer readable medium. Thus, this claim is indefinite.

Claims 2-15 and 29: The dependent claims are rejected for failing to remedy the deficiencies of the claims from which they depend.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, and 5-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williamson, "A Primal-Dual Approximation Algorithm for Generalized Steiner Network Problems."

<u>Claim 1</u>: Williamson discloses approximating a solution to a linear program, comprising:

- receiving a subset of data corresponding to the linear program (see page 708: Introduction, disclosing given data for a linear program, including an undirected graph, a non-negative cost function, a function, and the set of edges having exactly one endpoint in a set);

- adapting linear programming optimization algorithms, based on separation oracles (see page 709: column 1: full paragraphs 1-2, disclosing separation oracle f; see also page 709: column 2: paragraph 2, disclosing satisfying f in phases), to work with an approximate separation oracle (see id.) and the subset of data to solve a primal and dual linear program (see page 709: column 1: full paragraph 3 through column 2: paragraph 1, disclosing solving primal and dual LPs; page 710: section 2, disclosing a primal-dual method for approximation algorithms) within a same approximation factor as the approximate separation oracle (see page 710: column 2, disclosing "Thus the primal solution found is within a factor of a of the optimal primal LP solution, and therefore also within a factor of a of the optimal solution to (IP)"; see also page 709: column 1: first full paragraph, disclosing a solution within a factor of 2k of the optimal; page 711: column 1: final paragraph, disclosing "the dual solution found can be transformed into a feasible dual

solution for the linear programming relaxation of (IP) of at least the same value",

and also disclosing a factor of 2k).

Williamson does not explicitly disclose a user input that receives a selection of at least

one of the subset of data. However, the data variables of Williamson are not defined, and are

intended to be defined based on the particular situation of the problem to be solved. Williamson

discloses the claimed linear programming formula with variables; a user of the formula would

know that he is supposed to "input" of substitute data particular to his situation for the formula

variables. Examiner takes Official Notice that it was well-known in the art at the time the

invention was made to input actual data into formula variables in order to solve a formula for a

particular situation. Furthermore, Examiner takes Official Notice that it was well-known in the

art at the time the invention was made to perform such inputting using a computer. In the

context of linear programming, whose problems are difficult and time-consuming to solve, it is

common to utilize computing technology to solve problems. Thus, it would have been obvious

to one of ordinary skill in the art at the time the invention was made to receive a user input via

computer rather than substitute inputs for variables by hand, as disclosed by Williamson. One of

ordinary skill in the art would have been motivated to do so for the benefit of efficiencies gained

through the use of computers.

Williamson does not explicitly disclose a system comprising components that perform

the claimed methodology. However, Examiner takes Official Notice that it was well-known in

the art at the time the invention was made to automate processes. *See in re Venner*, 262 F.2d 91,

95, 120 USPQ 193, 194 (CCPA 1958). It would have been obvious to one of ordinary skill in

the art at the time the invention was made to automate the methodology of Williamson by

performing it on a system. One of ordinary skill in the art would have been motivated to do so
for the benefit of efficiently computing results.

Claim 2: Williamson discloses resolving an optimization of the dual linear program to
solve for an optimization of the primal linear program (see page 709: column 1: full paragraph 3
through column 2: paragraph 1, disclosing solving primal and dual LPs; page 710: section 2,
disclosing a primal-dual method for approximation algorithms).

Claim 5: Williamson discloses the approximate separation oracle comprising an
approximation algorithm for a minimum Steiner tree problem (see page 708: column 2: last
paragraph, disclosing Steiner tree problems).

Claim 6: Williamson does not explicitly disclose the approximate separation oracle
utilized in conjunction with an ellipsoid method to obtain a resolution for the primal and dual
linear programs. Examiner takes Official Notice that it was well-known in the art at the time the
invention was made to use the ellipsoid method to solve linear programs (see e.g. Karr,
"Derivation of the Ellipsoid Algorithm"; Wikipedia: "ellipsoid method"). It would have been
obvious to one of ordinary skill in the art at the time the invention was made to employ well-
known techniques for solving linear programs (i.e. the ellipsoid algorithm) in order to solve the
linear programs of Williamson. One of ordinary skill in the art would have been motivated to do
so for the benefit of the accuracies and efficiencies associated with the ellipsoid method.

Claim 7: Williamson discloses the resolution producing an approximation algorithm for a fractional Steiner tree packing problem (see page 708: column 2: last paragraph, disclosing Steiner tree problems).

Claim 8: Williamson discloses utilizing primal and dual linear programs representative of a fractional Steiner tree packing problem (see page 708: column 2: last paragraph, disclosing Steiner tree problems).

Claim 9: Williamson discloses the primal linear program comprising a representation of an aspect of at least one computer network system (see page 708: column 2: second to last paragraph, disclosing "design of networks").

Claim 10: Williamson discloses the subset of data comprising parametric data of a networked system (see page 708: column 2: second to last paragraph, disclosing "design of networks").

Claims 11-14: Williamson does not explicitly disclose the parametric data comprising capacity data, length data, cost data, and latency data. However, Williamson does suggest some of these limitations (see page 708: paragraph 2, disclosing a cost function; page 708: column 2: second to last paragraph, disclosing "design of networks" and "edge connectivity"). Furthermore, these limitations amount to an intended use and are insufficient to distinguish the

claimed invention over the prior art because there is no manipulative difference between the

claimed invention and the prior art. *See* MPEP 2111.02.

Claims 3, 4, 16-19, and 21-29 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Williamson in view of Karr, "Derivation of the Ellipsoid Algorithm."

<u>Claim 3</u>: Williamson discloses the optimization of the dual linear program comprising an

approximation range between R* and aR*; where a is the approximation factor (see page 710:

column 2: equation (b')). Williamson does not explicitly disclose wherein R* is a minimum

value produced by a binary search of an equality function produced via an ellipsoid algorithm

utilizing the approximate separation oracle, although Williamson does suggest this limitation

(see page 708: column 2, disclosing that f(S) = k; column 1: abstract, disclosing that k is the

maximum cut requirement of the problem). Karr discloses this limitation (see at least page 4:

section 3; specifically, Lemma 3.2, defining the lower bound; page 5: section 3.2, disclosing the

iterations to the lower boundary; page 6: figure 1). It would have been obvious to one of

ordinary skill in the art at the time the invention was made to set the lower bound of Williamson

to the minimum value disclosed by Karr. One of ordinary skill in the art would have been

motivated to do so for the benefit of obtaining an accurate solution (see Karr: page 5: section 3.2:

paragraph 1).

Furthermore, Examiner takes Official Notice that binary searches and the ellipsoid

algorithm were well-known at the time the invention was made (see Wikipedia: "binary search

algorithm" and "ellipsoid method"). It would have been obvious to one of ordinary skill in the

art at the time the invention was made to apply well-known algorithms to the methodology of

Williamson. One of ordinary skill in the art would have been motivated to do so for the benefit of the efficiencies associated with each algorithm.

Claim 4: Williamson discloses the optimization of the primal linear program comprising a value less than or equal to aR* (see page 710: column 2: equation (b') and subsequent text).

Claim 16: Claim 16 is substantially similar to elements of claims 1-3, 5, and 10 and is rejected under similar rationale.

Claim 17: Claim 17 is substantially similar to elements of claims 1-3 and 5-8 and is rejected under similar rationale.

Claim 18: Williamson discloses the known approximation method comprising a polynomial time a-approximation algorithm for finding the minimum weight Steiner tree (see abstract).

Claim 19: Claim 19 is substantially similar to elements of claims 3-5 and is rejected under similar rationale.

Claims 21 and 22: Claims 21 and 22 are substantially similar to claim 9 and are rejected under similar rationale.

Claim 23: Claim 23 is substantially similar to claims 10-14 and is rejected under similar

rationale.

Claims 24-27: The cited references do not explicitly disclose utilizing the optimum

distribution to efficiently transmit non-streaming data from a source node to a receiving node via

the networked system. Nor do the cited references explicitly disclose incorporating a broadcast

transmission, a multicast transmission, or a unicast transmission by the source node. However,

Williamson suggests these limitations (see page 708: column 2: second to last paragraph,

disclosing "design of networks"). Furthermore, these limitations amount to an intended use and

are insufficient to distinguish the claimed invention over the prior art because there is no

manipulative difference between the claimed invention and the prior art. *See* MPEP 2111.02.

Claim 28: Claim 28 is substantially similar to elements of claims 1-3, 5, and 10 and is

rejected under similar rationale.

Claim 29: Claim 29 is substantially similar to claim 9 and is rejected under similar

rationale.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Williamson

in view of Hougardy, "A 1.598 Approximation Algorithm for the Steiner Problem in

Graphs."

Claim 15: Williamson does not explicitly disclose an asymptotic approximation factor of about 1.59. Hougardy discloses this limitation (see title). It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the approximation factor of Hougardy to the approximations of Williamson. One of ordinary skill in the art would have been motivated to do so for the benefit of obtaining the most optimal solution.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Williamson in view of Karr and Hougardy.

Claim 20: Claim 20 is substantially similar to claim 15 and is rejected under similar rationale.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this

final action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Neil R. Kardos whose telephone number is (571) 270-3443. The

examiner can normally be reached on Monday through Friday from 9 am to 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Beth Boswell can be reached on (571) 272-6737. The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

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